

WHAT IS CLAIMED IS:

1. A plasma processing apparatus comprising:
 - a vacuum reactor having processing gas introduction means and evacuation means;
 - a shield electrode formed on an outer circumferential wall of the vacuum reactor; and
 - a specimen placing device having an antenna electrode for radiating high frequency power into the vacuum reactor;wherein first high frequency power is supplied to the antenna electrode, and high frequency power at a frequency lower than that of the first high frequency power is supplied to the antenna electrode and the shield electrode.
2. A plasma processing apparatus comprising:
 - a vacuum reactor having processing gas introduction means and evacuation means;
 - a shield electrode formed on an outer circumferential wall of the vacuum reactor;
 - a specimen placing device having an antenna electrode for radiating high frequency power into the vacuum reactor;and
 - an exciting coil formed on an outer circumference of an outer circumferential wall of the vacuum reactor;wherein a first high frequency power is supplied to the antenna electrode, and high frequency power at a frequency

lower than that of the first high frequency power is supplied to the antenna electrode and the exciting coil,

an impedance element is connected to the shield electrode, and a shield voltage is applied to the shield electrode by way of the exciting coil.

3. A plasma processing apparatus according to claim 2, wherein

a slit is formed at a portion, of the shield electrode, facing the exciting coil in a direction substantially perpendicular to the exciting coil.

4. A plasma processing apparatus according to claim 2, wherein

a slit is formed at a portion, of the shield electrode, facing the exciting coil in a direction substantially perpendicular to the exciting coil, and an opening or a dent is formed at a central portion of the shield electrode on an upper surface of the vacuum reactor.

5. A plasma processing apparatus according to claim 1, wherein

the antenna electrode and the shield electrode are connected by way of a power divider and a phase shifter.

6. A plasma processing apparatus according to claim 2, wherein

the antenna electrode and the exciting coil are connected by way of a power divider and a phase shifter.

7. A plasma processing apparatus according to claim 1, wherein

a disk-shaped cavity having a diameter corresponding to nodes of a standing wave formed on an upper surface of the specimen placed during plasma processing is formed at a central part of the antenna electrode.

8. A plasma processing apparatus according to claim 2, wherein

a disk-shaped cavity having a diameter corresponding to nodes of a standing wave formed on an upper surface of the specimen placed during plasma processing is formed at a central part of the antenna electrode.

9. A plasma processing apparatus according to claim 1, wherein

a disk-shaped dielectric layer having a diameter corresponding to nodes of a standing wave formed on an upper surface of the specimen placed during plasma processing is formed at a central part of the antenna electrode.

10. A plasma processing apparatus according to claim 2, wherein

a disk-shaped dielectric layer having a diameter corresponding to nodes of a standing wave formed on an upper surface of the specimen placed during plasma processing is formed at a central part of the antenna electrode.

11. A plasma processing apparatus comprising:

a vacuum reactor made of dielectric having processing gas introduction means and evacuation means;

a shield electrode formed on an outer circumferential wall of the vacuum reactor;

a specimen placing device having an antenna electrode for irradiating high frequency power into the vacuum reactor; and

a ZrO_2 flame-sprayed film formed on an inner wall surface of the vacuum reactor made of the dielectric;

wherein first high frequency power is supplied to the antenna electrode, and high frequency power at a frequency lower than that of the first high frequency power is supplied to the antenna electrode and the shield electrode.

12. A plasma processing apparatus according to claim 9 wherein a Y_2O_3 flame-sprayed film is provided on an inner wall surface of the vacuum reactor made of the dielectric.